

Design and Fabrication of the Lithium Beam Ion Injector for NDCX-II

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The Neutralized Drift Compression eXperiment (NDCX-II) is for the study of high energy density physics and inertial fusion energy research utilizing a lithium ion (Li^+) beam with a current of 93 mA and a pulse length of 500 ns (compressed to 1 ns at the target). The 130 keV injector consists of a 10.9 cm diameter lithium doped alumino-silicate ion source heated to $\sim 1300^\circ\text{C}$ and 3 electrodes. Other components include a segmented Rogowski coil for current and beam position monitoring, a gate valve, pumping ports, a focusing solenoid, a steering coil and space for inspection and maintenance access. Significant design challenges included managing the 3 kW of power dissipation from the source heater, temperature uniformity across the emitter surface, quick access for frequent ion source replacement, mechanical alignment with tight tolerance, and structural stabilization of the cantilevered 27" OD graded HV ceramic column. The injector fabrication is scheduled to complete by May 2011.

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